better quality, and is extensively used for building in the neighbourhood.

The coralline marbles from Bradley quarry, near Newton Abbot, from Torquay, and from the neighbourhood of Plymouth (Nos. 160 and 193) are remarkable beds interstratified with the slates and old red sandstones of Devonshire, and are supposed by geologists to have formed ancient coral reefs. The specimen from Bradley quarry has a black crystalline base, with white veins intersecting it, abounding with such genera of polyps, as fenestella, retepora, lithodendron, cyathophyllum, astræa, porites, and favosites, the sections of which are very beautiful. It contains also numerous fossil shells, the inhabitants of which had found shelter under the edges of the coral reefs.

No. 160 also contains a very beautiful specimen of marble from Iloor Lake, near Plymouth, and No. 193 contains several other specimens from the neighbourhood of Plymouth. The marble is chiefly of a blackish colour intersected by white veins, and marked by numerous fossils, especially by the favosites and other corals. The Plymouth marble is much valued for interior pavements, &c. and was extensively used in the breakwater and in the works of Dover pier. The specimen from Kingskerwell, near Torquay (No. 193), is a white and pink variety beautifully variegated by the white sections of the fossils. The Devonshire coralline marbles are certainly not inferior either in beauty or durability to those of Derbyshire, or any others which this country produces. Ornamental specimens of them are to be found in various conspicuous parts of the nave, as well as in Class XXVII., showing their application in the manufacture of chimney-pieces, fonts, tables, columns, &c. (see Nos. 4, 6, 39, 55, 106 of Class XXVII.) They may also be well studied in the Museum of Economic Geology, where they are shown both in a rough and polished state worked into various forms.

BUILDING STONES OF THE CARBONIFEROUS LIMESTONE.

The vast oceanic formation known under this name, constitutes, in English Geology, one of the best known varieties of rocks. Thrown up for the most part into a rugged mountain barrier, it surrounds every one of our coal fields, and the basin of the carboniferous limestone forms the vast trough in which thousands of feet in thickness of grits, shells, and carbonaceous layers termed the coal measures are now found reposing. Every true coal field has its surrounding and underlying mass of carboniferous limestone, and not a few have contributed specimens to the Great Exhibition; but it will be advisable first to say a few words on the general nature of this limestone, and the economic uses to which it is applied. The part of the carboniferous series usually termed by geologists the carboniferous or mountain limestone, is that thick mass varying from a few hundred to nearly 3,000 feet in thickness, lying between the old red sandstone and the millstone grit. This mass is composed in its lower part of alternations of limestone and shale: then succeeds a great central mass of nearly pure compact limestone, having every variety of colour, from the lightest grey to the most intense black, and also a great variety of structure. This is succeeded in the upper part of the formation by alternations of limestone beds, with grits and shales, which gradually lead up to the millstone grit, or farewell rock, so termed in some coal fields, because it forms the boundary beneath which workable coal is no longer found. It is chiefly with the central mass of compact limestone that we are at present concerned, as this is the one chiefly used for economic purposes. The stones of the carboniferous limestone are not much used for buildings of a superior character, nor even for ordinary house-building, probably on account of their liability to absorb water, and their consequent dampness. The Derbyshire marbles from this formation, however, are much used for interior decoration, and the beautiful polish of which most of the beds are susceptible, should draw attention to the fitness of numerous beds in this limestone for columns, sills, flooring, and many ornamental purposes. The stone is much used locally for building rubble walls, and for inferior ashlar. It contains a very large per-centage of lime, and therefore burns very economically into quick lime; and many of the more argillaceous beds undoubtedly possess hydraulic properties. The stone is also much used locally for mending and repairing roads, but should never be employed for this purpose except in situations where good drainage exists, as it will make a good road when tolerably dry, but when used in hollows and on heavy clay lands, where the drainage is defective, it frequently makes execrable roads. When burnt into lime, it is highly valued by the agriculturist, as it answers for the amelioration of clay soils much more effectively than the poor weak limes. Probably no mortars are superior to those made from the mountain limestones: the lime should, however, be compounded with ashes or some very dry and gritty variety of pit sand. These limestones are also much valued locally as a flux for smelting iron ores, and even in ordinary cast iron foundries the use of mountain limestone in the cupola will much facilitate the running of the metal. There are other uses of less importance to which this stone is applied, such as paving and curb stones, also in its broken state for garden and park walks and paths: but the above are the principal uses that are worth mentioning.

The exhibition contains specimens of mountain limestone from the Durham coal field, from the northern extremity of the Clee Hill coal field in Shropshire, from the great Orme's Head, probably connected with the coal field of Anglesea, from Buckley mountain, adjacent to the Flintshire coal field, from the Isle of Man, from the great Midland coal field, near Derby, and many specimens from St. Vincent's rock in the defile of the Avon, the Mendip Hills, and other parts of the Bristol and Somersetshire coal field. So large and varied a contribution of this particular limestone will display its uses and application to a variety of purposes, and I now proceed briefly to notice the principal localities in the order of their geographical arrangement. The first is a specimen from the mountain limestone of Wear Dale, with a beautifully polished surface nearly black and variegated by large sections of fossils probably turbinolia, or some other description of coral lying with their stems inclined at an angle with the bedding or stratification of the stone. If this specimen (No. 204 in catalogue) be a fair representative of the quarry, the stone is highly ornamental, and has few superiors in this country. No. 156 is also a beautiful specimen from Wear Dale, shewing sections of astræa, caryophyllia, and turbinolia. The specimen from the Clee Hill coal field (No. 189) is described as oolitic limestone, from the Oreton Bank works, and referred to in the illustrated catalogue as a remarkable instance of an oolitic limestone being sufficiently hard to take a good polish. The fact is, this is not an oolite at all as that word is generally understood, but simply a bed of oolitic limestone from the carboniferous series; that is to say, a bed of mountain limestone with an oolitic structure. There are plenty of such beds in the mountain limestone which are sufficiently hard and crystalline to take a polish: in fact, as far as we are aware, all the oolitic beds of the mountain limestone are capable of being polished. The specimen in question is a very light cream-coloured greyish stone, abounding with fossils and oolitic grains imbedded in a crystalline cement. The polish is not very brilliant, but would probably wear tolerably well, if protected from atmospheric influences and from accidental injury. The specimen from Great Ormes Head (No. 194) is from Ross quarry—a pale bluish-grey variety of limestone, which takes a very smooth surface and good polish, but is not sufficiently variegated for ornamental purposes. In No. 194 also is included the specimen from Buckley Mountain adjoining the Flintshire coal field. This is also a bluish-grey variety with a somewhat deeper tinge of colour than the last specimen, and is exhibited not as a marble or building stone, but on account of its properties as a hydraulic limestone. It probably, therefore, contains a small admixture of argillaceous matter in combination with lime, in which circumstances, according to the experiments of Vicat, lime possesses the property of hardening under water. Many other beds of the Buckley limestone are highly crystalline, and will admit of a very fair polish.

The specimens from the Isle of Man consist of black and grey varieties from the southern side of the island where they occupy a space of about sixteen square miles, covered for the most part by tertiary gravel. Amongst these is a variety of flag stone (*poridonia schisti*), from which the steps of St. Paul's cathedral were supplied. They were presented for that purpose by the then Bishop of Sodor and Man. The flag stone resembles some of the beds worked in the black rock at Bristol, and the quarries have been worked for several hundred years. The stone is extensively used for flooring, chimney-pieces, tombstones. A specimen is shewn with an inlaid pattern of red cement, in imitation of encaustic flooring. The specimens of grey and black marble take a good polish, and the former has been used in building Castle Rushen (900 years old), King William's College, St. Thomas's Church, Douglas, and Castletown pier. No. 193 contains specimens of encrinital black marble from St. Vincent's rocks near Bristol, but by far the finest collection of specimens from the carboniferous limestone of the British coal field is comprised in No. 29, which contains twenty specimens from a great number of beds in the defile of the Avon below Bristol. All these specimens are polished on one side, and present a great variety of beautiful marbles, differing much in their structure and in the fossil remains which they contain. Some of the beds have a strikingly marked oolitic structure, the fracture much resembling that of the true oolites, except that the stone is harder, and the cement in which the ova are imbedded is more crystalline than in the true oolites. Many specimens are beautifully veined by streaks of different coloured carbonates of lime which have filtered into their cracks. Many beds appear to be almost entirely composed of fossils: some of these are encrinital, so called from the abundance of encrinital stem which they contain: others are coralline, containing caryophyllia and favosites in abundance, while others are filled with the shells of mollusca of the genera spirifer and producta, and some beds are entirely composed of terebratulæ. These fossiliferous beds all yield sections of singular beauty and variety, according to the general disposition of the fossils, whether at right angles or at other inclinations to the plane of stratification. Many of the beds contain fragments of red jasper, which give a pleasing variety to the polished surface, while others contain angular and broken fragments of older limestones of the very same series which appear to have been consolidated and afterwards broken up before the deposit of the succeeding layer. Mr. Huward, C.E., the collector of the very extensive assortment of Bristol minerals, has added to his specimens of building stones the weight per cubic foot of each specimen, and from the statements thus furnished by him it appears that the carboniferous limestone of the Avon rocks varies in weight from 162 to about 175 lbs. per cubic foot.

The specimen of marble from the Mendip Hills (also in No. 29) is a dull dark grey variety with white veins of carbonate of lime passing through it, but it is probable that these hills contain nearly the same varieties as the Avon defile. An inspection of the marbles exhibited from the Bristol district will naturally suggest the idea that they might be much more extensively employed for ornamental purposes. We believe them to be equally varied and beautiful with the Derbyshire marbles, and yet they appear to attract no attention, and give rise to no industrial employment either on the spot or elsewhere. It is true they are not adopted like the primitive granular marbles of Greece and Italy for statuary purposes, nor to preserve their polished surfaces exposed to the vicissitudes of a climate like that of Great Britain; yet for many pur-